Analysis of Brownfield Cleanup Alternatives

Cumberland City Hall
402 West Main Street
Cumberland, Kentucky 40823

Grant Number BF-00D00112-0

Prepared for:

Cumberland Valley Area Development District

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TABLE OF CONTENTS

FIGURES

TABLES

DISTRIBUTION LIST

Analysis of Brownfield Cleanup Alternatives
Cumberland City Hall
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List of Acronyms and Abbreviations

ABCA	Analysis of Brownfield Cleanup Alternatives
ACM	Asbestos-containing material
AHERA	Asbestos Hazard Emergency Response Act
AMEC	AMEC Environment & Infrastructure, Inc.
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NVLAP	National Voluntary Laboratory Accreditation Program
OSHA	Occupational Safety and Health Administration
O&M	Operations and Maintenance
PLM	polarized light microscopy
Site	402 West Main Street, Cumberland, KY

1.0 INTRODUCTION

This document presents the results of an Analysis of Brownfield Cleanup Alternatives (ABCA) for the Site at 402 West Main Street, Cumberland, Harlan County, Kentucky.

This ABCA includes a discussion of the following:

- Identification and Development of Cleanup Alternatives
    - Description of Current Situation
    - Establishment of Cleanup Objectives
    - Screening of Cleanup Technologies
- Evaluation of Cleanup Alternatives
    - Technical/Environmental/Human Health/Institutional
    - Cost Estimates
- Justification and Recommendation of Cleanup Alternative(s)
    - Technical
    - Environmental
    - Human Health

1.1 Facility Background

Figure 1 is a topographic map showing the location of the property at 402 West Main Street, Cumberland, Kentucky. The property is located in a predominantly commercial area. The property is currently used as City Hall and the building dates from the 1920s. The building is two-story with a partial basement and has a brick veneer structure constructed on a crawlspace and partial basement. The first floor houses City Hall and the second floor consists of a large unoccupied apartment. The building contains approximately 4,000 square feet of space. The existing roof appears to be constructed of built up or rolled roofing materials. The building was donated to the City of Cumberland by the Guaranty Deposit Bank. The current plan is to refurbish the building to allow for full use.

The subject property is bound to the north by W. Main Street, to the south by Caudill Street, and to the east by Isaac Street. Paved areas are located to the west, east and south sides of the building.

The current uses of immediately adjoining properties are residential and commercial and are identified below:

Direction	Property Description
North	Tri City Clubhouse
Northwest	Lillian's Novo Center
West	Thrift Bit Service
Southwest	Residential
South	Residential
Southeast	Residential
East	Commercial
Northeast	Cumberland Missionary Baptist Church

AMEC conducted a Phase I environmental site assessment (ESA) of this property in December 2013 (AMEC 2013). Based on observations during the Phase I ESA, asbestos-containing materials (ACM) were suspected to be present in the building. In 2014, an ACM survey was conducted, during which 52 samples were collected.

ACM Survey Results:

In March 2014, AMEC conducted an inspection of the building to identify ACM within the interior and exterior of the structure (AMEC 2014). A total of 52 samples were collected from 20 different homogeneous sampling areas (HSAs). In most cases, at least two samples of each material were collected. Exceptions were related to materials with a limited quantity or materials that were not safely accessible from multiple access points. The asbestos survey was performed by Kentucky accredited building inspector Mr. Phillip Applegate, in general accordance with a sampling protocol appropriate for the renovation or demolition of existing structures. The sampling protocol was modeled after U.S. Environmental Protection Agency (EPA) regulation 40 CFR 763. The approximate quantity of materials was determined by field measurements.

The bulk sampling procedures utilized for the collection of suspect materials first required the establishment of HSAs. A homogeneous area is defined by the Asbestos Hazard Emergency Response Act (AHERA) as a material suspected of containing asbestos that is of the same color and texture and that appears to have similar uses, installation dates, etc.

The individual sampling areas were then examined and representative samples of the suspect materials were randomly taken. The collected bulk samples were shipped under chain-of-

custody protocol to EMSL Analytical Laboratory (EMSL) in Cinnaminson, New Jersey for analysis by Polarized Light Microscopy/Dispersion Staining (PLM) in accordance with EPA testing methods. The samples were analyzed by the PLM method in accordance with the EPA Method for the Determination of Asbestos in Bulk Building Materials (EPA 600/R-93/116). EMSL is accredited by the National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program for bulk asbestos identification by PLM.

PLM is the mandated method of analysis by EPA and OSHA for asbestos identification in bulk samples. The detection limit for this type of analysis is approximately one percent (by volume). Materials containing more than one percent asbestos are considered to be ACM.

The following suspect materials (materials thought to possibly contain asbestos) were sampled during the survey. The roof was not assessed as part of this survey because of safety concerns and there are no plans for its removal.

1. Wall plaster (walls & ceilings - 1st & 2nd floor conference room, bedroom 1, pantry, bedrooms 2, and living room)
2. White duct tape (metal ductwork -basement south area on metal ductwork)
3. White covering (above ceilings -1st floor Lobby & Clerk's Office)
4. White material (duct chase - 2nd floor bedroom #3)
5. Gasket material (abandoned furnace - basement)
6. Drywall sheeting (ceiling- basement)
7. 2'x4' fissured pinhole tile (ceiling -1st floor Lobby, Clerk's Office and Conference Room)
8. Blown-in insulation (Lobby, above vault, and above Conference Room - 1st floor
9. Interior window glazing (Lobby - 1st floor)
10. Green with black backing wallpaper (kitchen wall - 2nd floor)
11. Off white floor tile (between subfloor - Clerk's Office and Lobby - 1st floor)
12. Popcorn wall texture (Clerk's Office - 1st floor)
13. Popcorn ceiling (bathroom - 1st floor)
14. Green pattern sheet vinyl (bathroom - 1st floor)
15. Wall board-drywall (bedroom # 2 - 2nd floor)
16. 9" tan/brown floor tile & mastic (hall, hall room #1, and bathroom #2 - 2nd floor)
17. Cream sheet vinyl (bathroom #1- 2nd floor)
18. Off white sheet vinyl (bathroom #2 - 2nd floor)
19. 12" light gray mottled floor tile & mastic (hall - 2nd floor)
20. Exterior window glazing (window - 2nd floor)

Results of ACM Inspection:

Based upon visual observations, bulk sampling of suspect materials, and subsequent microscopic analysis, nine of the HSAs were reported as having greater than one percent asbestos. A summary of the identified ACMs is presented in **Table 1**. Friable ACM is defined as any material that contains more than one percent asbestos by weight that hand pressure can crumble, pulverize, or reduce to powder, when dry. The EPA categorizes non-friable materials into two categories. Category I non-friable materials are specifically defined as resilient floor coverings, asphalt-based bituminous roofing materials, packings, construction mastics, and gaskets. Category II non-friable materials include all other non-friable materials such as asbestos cement products, vibration dampeners, caulking, putty, etc.

2.0 IDENTIFICATION AND DEVELOPMENT OF REMEDIAL ALTERNATIVES

This section describes establishment of cleanup objectives and screening of remedial technologies.

2.1 Establishment of Remedial Objectives

ACM is subject to a variety of regulatory requirements, summarized as follows:

- 40 CFR 61, Subpart M - National Emission Standards for Hazardous Air Pollutants (NESHAP) - Asbestos, requires removal of regulated ACM (RACM) from buildings prior to renovation or demolition. This typically requires an intrusive investigation to identify ACM hidden in floors, wall, ceilings, etc. RACM is generally defined as materials which contain greater than 1% asbestos and are one of the following:
    1. Friable (i.e. when dry, can be reduced to powder by hand pressure).
    2. Non-friable materials which have become friable.
    3. Category I non-friable materials which have been sanded, ground, cut, or abraded.
    4. Category II non-friable materials which are expected to become friable due to the forces expected to act on them during the course of demolition.
- 40 CFR 763 - AHERA requires management of asbestos in schools and provides a standard of care for asbestos surveys. AHERA surveys are typically baseline surveys; they do not identify several types of NESHAP regulated materials (e.g. hidden or exterior ACM).
- 29 CFR 1910.1101 - U.S. Occupational Health & Safety Administration (OSHA) asbestos regulations require management of asbestos in buildings to protect workers. AHERA surveys meet the OSHA requirement to identify ACM in buildings.

2.2 Exposure Pathways

If friable and damaged, ACM, unless abated or included in an Operations and Maintenance (O&M) Plan, can result in exposure to building occupants.

2.3 Screening of Cleanup Technologies

This section discusses screening of appropriate cleanup technologies.

2.3.1 General Response Actions

General response actions describe those actions that will satisfy the site cleanup objectives. These include:

- No action;
- Encapsulation;
- Removal/Abatement; and
- Any combination of the above technologies, as appropriate.

Specific remedial technologies then were identified for these general response actions, as described in Section 2.3.2.

2.3.2 Identification of Potential Remedial Technologies

A comprehensive list of cleanup alternatives was assembled for the ABCA. Potential remedial technologies or categories of technologies were identified and screened, and are listed below. A list of potential remedial technologies is described in **Table 2**. This table identifies each potential remedial technology, compares the technology against relevant screening criteria, and provides a brief description of each technology and its apparent advantages and disadvantages.

The technologies identified for the screening evaluation are as follows:

ACM:

No Action

Stabilization and/or Encapsulation with O&M Plan

Removal/Abatement

2.3.3 Description of Initial Potential Remedial Technologies

2.3.3.1 No Action

Under the no action option, no remedial action would be performed, nor would any engineering or institutional controls be implemented. This alternative is provided as a baseline for comparison to the remedial technologies considered.

2.3.3.2 Removal/Abatement

This involves abatement/removal of friable ACM identified in the survey using a licensed contractor. This precludes having to develop and implement an O&M Plan for friable materials. However, since the roof was not sampled due to safety concerns, it should be assumed asbestos is present, unless later samples confirm it is not. In this case, an O&M Plan for roofing materials is required.

2.3.3.3 Stabilization and/or Encapsulation with O&M Plan

For friable ACM, encapsulation is an alternative which would be designed to prevent exposure to or release of fibers, dust, or other materials containing these substances. For example, an encapsulating acrylic, water-based, low volatile organic compound primer and conditioner can be applied to fibrous and porous ACM. This functions as a penetrating and flexible encapsulant and primer to which a topcoat(s) can be applied. Most encapsulants can be brushed, rolled, or sprayed on.

If ACM is to be left in place, i.e., not removed/abated, then an O&M Plan will be required to be developed and implemented. This Plan would detail training requirements for employees and contractors, notification requirements prior to ACM removal activities, administrative procedures covering work that may disturb ACM, maintenance of ACM including routine maintenance and cleaning and discussion of prohibited activities, requirements for removing or disturbing ACM, and requirements for ACM contractors/consultants.

2.3.4 Initial Screening Criteria for Potential Remedial Technologies

The initial screening of potential remedial technologies has been completed based upon six balancing factors, as described below. The results of the technology screening are presented in **Table 2**. This table lists each remedial technology, followed by a brief process description, its apparent advantages and disadvantages, and a recommendation for detailed analysis. The six balancing factors are summarized below.

- *Effectiveness* - Considers the magnitude of risk from untreated contamination or treatment residuals, adequacy of institutional and engineering controls, extent to

which beneficial uses are restored or protected, and time until remedial action objectives are achieved.

- *Long-term Reliability* - Evaluates the reliability of the treatment technology, the reliability of engineering and institutional controls necessary to manage risk, and uncertainties in long-term management (operation, maintenance, and monitoring).
- *Implementability & Implementability Risk* - Focuses on practical, technical, and legal difficulties and unknown factors associated with the remedy; the ability to monitor effectiveness; federal, state, and local requirements; and the availability of necessary services, materials, equipment, and specialists. Also looks at potential impacts on the community; potential impacts on workers and site operations; potential impacts on the environment; and the time required to complete the remedial action.
- *Reduction of Toxicity, Mobility, or Volume of Wastes* - Focuses on treatment process used and materials tested; the amount of hazardous materials destroyed or treated; the degree of expected reductions in toxicity, mobility, and volume; the degree to which treatment is irreversible; and the type and quantity of residuals remaining after treatment.
- *State and Community Acceptance* - Considers reuse and future planning.
- *Reasonableness of Cost* - Determines capital, operation and maintenance, and periodic review costs of the remedial action; and the degree to which costs are proportionate to benefits to human health and the environment.

Estimates of costs, if any, are order-of-magnitude estimates only and are only to be used for comparison of alternatives.

The potentially applicable remedial technologies are evaluated in greater detail in later sections to assist in determining which remedial technology or technologies may be most appropriate for the site. The remedial technologies included in the screening process are grouped into several general response actions, as described in Section 2.3.1, and the results of the screening are summarized in the following sections.

2.3.4.1 No Action

The No Action option has no inherent implementation risk, has no cost, and is easily implementable. However, the No Action option is not effective and does not offer long-term reliability, because it is not protective of human health and the environment. Furthermore, the

cleanup goals for the site would not be met if this option were implemented. However, this alternative will be retained to serve as a baseline.

2.3.4.2 Removal/Abatement

For existing known ACM, abatement provides the best solution for mitigating risks and avoiding later exposure should the site not be maintained properly.

2.3.4.3 Stabilization and/or Encapsulation with O&M Plan

Encapsulation does not remove the need to maintain non-friable ACM, so such an approach would require an O&M Plan. For the risks that would remain to potential future building occupants, encapsulation is not considered viable for friable ACM. Also, since non-friable ACM can become friable if not properly maintained or protected, this alternative is not retained for further consideration.

2.4 Retained Remedial Technologies

The retained potential technologies are listed in **Table 3**.

3.0 IDENTIFICATION OF CLEANUP ALTERNATIVES

Based upon the screening in Section 2.0, the following alternatives were identified, and will be discussed in detail in the subsequent sub-sections:

Alternative No. 1 - No Action
Alternative No. 2 - Removal/Abatement

A broad conceptual design and summary of these remedial alternatives is provided to enable adequate evaluation and comparison. It is expected that a final detailed design of the selected remedial alternative will be completed prior to implementation. As part of the design process, necessary modifications to the conceptual design may be necessary. Also note that the cost estimates included in the evaluation are based upon a conceptual design and are provided only to enable comparison of alternatives.

3.1 Alternative 1: No Action

Alternative 1 would involve no remedial actions and serves as a baseline for comparing other alternatives. Facility activities would occur without any restrictions and without regard for existing ACM or its condition.

3.2 Alternative 2: Removal/Abatement

Alternative 2 involves removal/abatement of known ACM, as follows (and per Table 1). Abatement eliminates the risk from all forms of known ACM.

Window glazing results were positive for the presence of asbestos on the second floor. The individual window frames throughout the second floor of the building showed a variety of repair methods including glass, wood, and empty panes. Therefore, due to this variation, it is recommended that window glazing be treated as ACM.

The roof was not safely accessible and was not sampled. The roofing materials should be considered as ACMs until they can be sampled.

Approximately 30 square feet of sheet vinyl ACM was reported. A white covering on ductwork which is ACM has an estimated quantity of 250 square feet, based on accessible areas above two ceilings. Small quantities of various other ACMs will also be abated (white duct tape, white material inside wood pipe chase, and furnace gasket material). Also, various floor tiles and mastics are ACM and estimated quantity is approximately 1,070 square feet.

4.0 EVALUATION OF CLEANUP ALTERNATIVES

In this section, each retained cleanup alternative is described in greater detail. Each alternative was evaluated against: protectiveness, effectiveness, long-term reliability, implementability, implementation risk, and cost reasonableness. Costs are expressed in 2014 dollars.

4.1 Alternative 1: No Action

Protectiveness

The No Action alternative does not achieve the protectiveness requirements, and the corrective action objectives are not satisfied.

Effectiveness

The alternative is not effective at reducing or managing risk. The magnitude of residual risk is unacceptable.

Long-term Reliability

This alternative does not achieve long-term reliability.

Implementability

The No Action alternative is easy to implement.

Implementation Risk

No risk would be incurred during implementation of the No Action alternative.

Reasonableness of Cost

No costs would be incurred in implementing the No Action alternative.

4.2 Alternative 2: Removal/Abatement

Alternative 2 involves abatement of known ACM currently identified. Assuming roofing materials contain asbestos, an O&M Plan would also be required.

Protectiveness

This alternative satisfies the protectiveness criterion. Protectiveness is achieved by removal of known ACM inside the building.

Effectiveness

This alternative is effective, since the risk of exposure to friable ACM will be mitigated and the risk of non-friable ACM becoming friable is also eliminated.

Long-Term Reliability

Abatement and removal is a permanent fix for ACM.

Implementability

Implementation of Alternative 2 would be moderately difficult. Proper containment practices would have to be implemented during abatement, and final air clearance samples collected before re-occupation of abated areas would be allowed.

Implementation Risk

The implementation risk associated with this alternative is considered low to moderate.

Reasonableness of Cost

A cost estimate for Alternative 2 is approximately $44,026. This cost estimate is based on the following assumptions: (1) abatement methodologies were selected based on the most cost effective approach, (2) known ACM will be removed in their entirety, (3) scale labor rates for local contractors are included, (6) clearance sampling costs are included for one mobilization, and (4) failure of clearance samples resulting in re-sampling is not included. **Table 4** provides details of the cost estimate.

5.0 RECOMMENDED CLEANUP ALTERNATIVES

The selection of the recommended cleanup alternative is based upon the evaluation and comparison of alternatives contained within preceding sections of this report.

Based upon the evaluation of the technologies, the recommended remedial alternative is as follows:

Alternative No. 2 - Removal/Abatement (known ACM)

For Alternative 2, the following ACM will be abated or removed (for details see AMEC 2014 and Table 1):

- Friable window glazing 2nd floor east side, south window, east side north window, and north side window), approximately 230 square feet;
- Friable white duct tape (basement south area), approximately 10 square feet
- Friable white covering on duct work (1st floor lobby south, south center, and center areas above ceilings), approximately 250 square feet (based on accessible areas above two ceilings);
- Friable white material inside wood pipe chase (2nd floor bedroom #3 duct chase east wall), approximately 2 square feet;
- Nonfriable sheet vinyl (2nd floor bathroom #1), approximately 30 square feet;
- Nonfriable floor tile and/or mastic (1st floor between sub-floor Clerk's office, lobby south area, lobby west area, 2nd floor hall, hall room, bathroom #2, 2nd floor hall near skylight, and north hall area), approximately 1,070 square feet; and
- Nonfriable furnace gasket material (basement abandoned furnace), approximately 3 square feet.

Abated ACM will be transported to an off-site permitted landfill(s) for proper disposal. Cost estimates in Table 4 include transport & disposal.

Other constraints/conditions include:

- All contractors and employees should be alerted to the presence and location of the identified hazards, in accordance with applicable OSHA regulations.

- If concealed ACM is observed during renovation activities, it will be necessary to investigate and collect samples in order to confirm the presence or absence of ACM.

6.0 REFERENCES

AMEC, 2013. *Phase I Environmental Site Assessment, 402 West Main Street, Cumberland, Kentucky*. December 2013.

AMEC, 2014. Asbestos, Lead Based Paint, & Mold Inspection at Cumberland City Hall Building, 402 West Main Street, City of Cumberland, Harlan County, Kentucky, 12 May 2014.

FIGURES

Figure 1: Site Location Map

Figure 2: Site Map

TABLES

Table 1. Summary of Asbestos-Containing Materials

Sample No.	HSA Sampled	Sample Location	Estimated Quantities	Friable
200-01, 02, 03	White Duct Tape	Basement South Area	10 square feet	Yes
201-01, 02, 03	White Covering (on ductwork)	1st Fl. Lobby South, South Center, & Center Areas Above Ceilings	250 square feet visible*	Yes
202-01	White Material (inside wood pipe chase)	2nd Floor Bedroom #3 Duct Chase East Wall	2 square feet	Yes
300-01, 02	Furnace Gasket Material	Basement Abandoned Furnace	3 square feet	No
306-01, 02, 03	Off White Floor Tile & Mastic	First Floor Between Sub Floor Clerk's Office, Lobby South Area, & Lobby West Area	600 square feet	No
311-01, 02, 03	9" Tan Brown Floor Tile & Mastic	2nd Floor Hall, Hall Room, & Bathroom #2	300 square feet	No
312-01, 02	Cream Sheet Vinyl	2nd Floor Bathroom #1	30 square feet	No
314-01, 02	12" Light Gray Mottled Floor Tile & Mastic	2nd Floor Hall Near Skylight & North Hall Area	170 square feet	No
315-01,02 ,03	Exterior Window Glazing	2nd Floor East Side South Window, East Side North Window, & North Side Window	230 square feet	Yes

* Estimated total based on accessible areas above two ceilings. The quantity maybe more once ceilings are demolished.

Table 2. Potential Cleanup Technologies

Identified Remedial Technology	Effectiveness L/M/H	Long-term Reliability L/M/H	Implement-ability L/M/H	Implementation Risk L/M/H	Reduction of Toxicity, Mobility, or Volume of Wastes L/M/H	State & Community Acceptance L/M/H	Cost L/M/H	Comments	Retained Y/N
No Action	L	L	H	L	L	L	L	While not protective, this option is carried through for comparison purposes.	Y
ACM Removal - Abatement	H	H	M/H	L/M	M/H	H	M	Abatement mitigates future risk from friable ACM. Cost effectiveness may be reduced if substantial ACM is later found behind interior walls that must be removed .	Y
Stabilization, Encapsulation & O&M Plan	H	H	H	L	M	H	L/M	Stabilization and encapsulation does not remove the need to maintain friable ACM, so would require an O&M Plan. For the risks that would remain to building occupants, encapsulation is not considered viable for friable ACM.	N

Table 3. Identified Technologies & Screening Results

Remedial Alternative	Remedial Technologies	Description	Effective-ness	Long-Term Reliability	Implement-ability	Implement-ation Risk	Reduction of Toxicity, Mobility, or Volume	Cost Reasonableness	Comment
1	No Action	No engineering or institutional controls would be implemented. Site activities would occur without regard for existing ACM. This option serves as a baseline for comparing other alternatives.	Poor	Poor	Easy	None	None	Good	Not protective, therefore unacceptable.
2	Removal/Abatement for ACM	Abate known ACM in the building. Remove windows with ACM.	Good	Good	Moderately difficult	Low to Moderate Risk	Good	Good	An O&M Plan will be required if any non-friable ACM is left in place (e.g., roof).

Table 4. Removal/Abatement Cost Estimate

Description	Unit	Quantity	Unit Cost	Cost
Site Preparation				
Required Plans (e.g., CAP, QAPP, HASP)	Lump Sum	1	$5,000	$5,000
Develop Design Specifications for Abatement	Lump Sum	1	$2,000	$2,000
Abatement				
Window glazing (abate via sash removal)	Sashes	20	$52	$1,037
White duct tape	Square Feet	10	$31.91	$319
Duct work (1st floor above ceiling; component removal)	Square Feet	250	$65.41	$16,352
White thermal system insulation (2nd floor pipe chase)	Square Feet	2	$159.53	$319
Furnace gasket material	Square Feet	3	$106.35	$319
White floor tile/mastic, 1st floor	Square Feet	600	$9.04	$5,425
9" tan floor tile/mastic	Square Feet	300	$2.66	$799
Cream sheet vinyl	Square Feet	30	$10.64	$319
12" gray floor tile/mastic	Square Feet	170	$3.75	$638
Site Restoration				
Containment Teardown, Air Clearance, and Demobilization	Lump Sum	1	$500	$500
Reporting				
Progress Reporting, Meetings, Abatement Report	Lump Sum	1	$4,500	$4,500
O&M Plan	Lump Sum	1	$1,500	$1,500
Additional Costs				
Project Management/Oversight	Lump Sum	1	$5,000	$5,000
	Total Costs for ACM Abatement			**$44,026**

Assumptions:

1. Areas and ACM to be abated are the same as those identified in the ACM survey.
2. Estimated costs for labor, supplies, travel & living expenses, and ACM transport & disposal are included in ***Abatement*** section.

CAP = Corrective Action Plan

QAPP = Quality Assurance Project Plan

HASP = Health & Safety Plan